**“Part of Unit #8”**

Types of Chemical Reactions

1. **Endothermic-** absorbs energy (heat) from its surroundings.
   1. Ba(OH)2 **.** 8H2O + 2NH4NO3 →→→ Ba(NO3)2 + 2NH3 + 10H2O
2. **Exothermic-** releases energy to its surroundings.
   1. Mg + 2HCl →→→ H2 + MgCl2
3. **Combustion-** an element or compound reacts with oxygen, often producing energy (heat & light).
   1. Combustion of an element:
      1. *General formula: A + O2 →→→ AO2*
      2. *S + O2* →→→ SO2 (+ energy (fire))
      3. 2Mg + O2 →→→ 2MgO (+ energy (fire))
   2. Combustion of a hydrocarbon:
      1. **Hydrocarbon-** an organic compound that contains only Carbon and Hydrogen.
      2. *General formula: CxHy + O2 →→→ CO2 + H2O*
      3. CH4 + 2O2 →→→ CO2 + 2H2O
4. **Synthesis-** also known as "combination" reactions; two or more substances react to form a single substance.
   1. *General formula: A + B →→→ AB*
   2. 2H2 + O2  →→→ 2H2O
5. **Decomposition-** a single compound is broken down into two or more simpler substances.
   1. *General formula: AB* →→→ *A + B*
   2. H2CO3 →→→ H2O + CO2

Electricity

* 1. 2H2O →→→ 2H2 + O2 (this process is called electrolysis, meaning: splitting with electricity)

1. **Single Replacement-** atoms of a more reactive element, replace those of a less reactive element.

These types of reactions depend on the "Activity Series".

* 1. **Activity series-** a listing of metals in decreasing activity. (Just as in "electrochemistry", any metal above any other metal(s), can replace those below it.
  2. *General formula: A + BC →→→ B + AC*

Solid Ionic species solid Ionic species

*(where "A" is more reactive than "B")*.

**What will the products be of the following reactions?**

* + 1. Mg + Zn(NO3)2 *→→→ Zn + Mg(NO3)2*
    2. Mg + 2AgNO3 *→→→ 2Ag + Mg(NO3)2*
    3. Mg + LiNO3 *→→→ N.R.*

1. **Double Replacement-** exchange of cations between two compounds.
   1. *General formula: AB + XY →→→ XB + AY*

*(will* ***only*** *occur if: one of the products is either a solid, gas, or a salt with water)*

* 1. Example with a ppt. (solid) produced.
     1. Pb(NO3)2 + 2KI *→→→* PbI2 + 2KNO3
  2. Example with a gaseous product.
     1. H(C2H3O2) + NaHCO3 →→→ Na(C2H3O2) + H2CO3
        1. Note that the H2CO3  rapidly undergoes simultaneous reaction:

H2CO3  →→→ H2O + CO2

**What type of reaction is this?** *Answer: Decomposition*

* 1. Examples with a salt and water being produced.
     1. HCl + NaOH →→→ NaCl + H2O

The following reaction is what occurs when someone takes a small dose of "Milk of Magnesia" for heart burn (large doses act as a laxative:

* + 1. 2HCl + MgCO3 →→→ MgCl2 + H2CO3 **(which rapidly decomposes into what?** *Answer: H2O + CO2****)***